Effective Teaching and Feedback Strategies in the OR and Beyond

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Abstract

Maintaining a standard of excellence for graduating surgical residents requires a comprehensive and consistent approach to surgical education. The omnipresent and increasing barriers to education must also be recognized and addressed. The implementation of effective teaching strategies is largely dependent on the resources available at each institution and the vision of education. Unfortunately, allocating time for surgeons to teach both inside and outside the operating room has become a foreign concept to administration. Furthermore, the reduction in case numbers performed by trainees now demands "quality over quantity" to ensure success. Quality teaching moments will only be realized when emphasis is placed on preparation, useful instruction during the procedure, and postoperative feedback. Ideal preparation entails a detailed discussion between the trainee and surgeon about the specific learning goals for the case. During the procedure, the faculty surgeon must strive to maximize the experience through effective communication while performing an efficient and safe operation. Numerous validated objective assessment tools exist for postprocedure evaluation but are grossly underutilized. Surgical education must thoughtfully be approached with the same fervor and detail as patient care. As faculty, it is our responsibility to train the next generation of surgeons and therefore "every case must count."

Keywords
- surgical education
- feedback
- training
- colorectal
- residents
- residency

Objectives: Upon completion of this article, the reader should be able to summarize several effective teaching strategies during the procedure and discuss the barriers that exist to the surgical education.

Teaching general and subspecialty residents in the operating room in the era of Accreditation Council for Graduate Medical Education work hour restrictions has become increasingly complicated. Numerous barriers blanket effective training strategies, but the core of the problem is often the lack of sincere interest by the attending surgeon. The failure of the teacher to take ownership over training the next generation of surgeons pervades our current academic surgical world. New technology, a different culture of residency, personal interests of the trainer, alterations in the financial landscape, and the impact of health care on administration are impediments to training. The reduction in case numbers performed by trainees is apparent. Successful training will only be realized when an emphasis is placed on preparation for the operating room, useful instruction during the case, and feedback after the procedure. The attentiveness to the details of education by both residents and faculty must be nearly equivalent to the three phases of surgical patient care: preoperative, intraoperative, and postoperative management. This chapter briefly highlights some of the published and theoretical approaches to improve training. Their practical application depends on numerous variables at each institution, but they may be used as a reference. We became surgeons to take exceptional and meaningful care of patients. Ideally, we became academic surgeons to teach residents how

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to both master our trade and emulate our patient care. If teaching effectively is a lost or nonexistent priority amongst both administrators and surgeons, than we are failing professionally.

Recognize the Barriers

Administration and Health Care

Effective teaching strategies are largely dependent on both the resources available at each institution and the vision of education imparted from the department chair and or administration. Allocating additional time for surgeons to teach residents both inside and outside the operating room has become a foreign concept to administration. This, in my opinion, is the greatest impediment to training. In their myopic world, "time is money" and when there is no direct tangible financial gain for the hospital, there are no incentives for training. More recently, several institutions have also exchanged their salary-based system for faculty with an incentive-driven compensation plan for increased volumes. This alteration will further hinder educational interests. In essence, academic surgeons are being asked to do more with less clinically, while maintaining their research interests and training responsibilities. These changes have fostered a pessimistic and apathetic attitude amongst academic surgeons in regards to training.

Strategy

The reality of the times will not be defeated, but as surgeons we must continue to stress the critical role that our residents play in patient care. Without residents, our volumes would diminish, our academic aspirations would wane, and our lifestyles would dramatically change. These undisputable facts must be repeatedly emphasized to hospital leadership and also remembered each day when we approach a case with a trainee. Academic surgeons should demand having their clinical volumes evaluated as a 90% full time employee (FTE) with 10% allotted for teaching. This argument can be strengthened by numerous publications demonstrating that cases with trainees take significantly longer.[1–4] Without this fundamental change, most will continue to argue that they are not being paid to teach. This may be inherently true, but it is than the responsibility of that faculty member to take your own patient calls on the floor. Irrespective of the frustrations that exist with administration, the relationship of the trainer and trainee is always of both give and take.

New Technology

The widespread development of technological "advances" in surgery is not only exciting but also imperative to provide improved patient care. However, when industry and personal interests are involved, training again takes a backseat. There are countless examples of this across all specialties, but I will highlight the most topical for colorectal disease.

As surgeons finally became comfortable with performing and teaching laparoscopic colectomy, robotics, and single incision approaches for colorectal resection were introduced. These technological "advancements" immediately became the new kids on the block and we have been inundated with publications and presentations at regional or national meetings. Furthermore, surgeons have pushed their personal agendas forward claiming their niche in the "latest and greatest" of laparoscopic colorectal resection. Industry readily championed any indication for their new device, and as the gap amongst opinion leaders widened, education was again left on the sidelines. The theoretical and practical advantages of this new technology in the appropriate spectrum should not be discouraged. However, rarely has the momentum been halted to reflect on the impact on training minimally invasive colorectal surgeons. National and institutional laparoscopic colectomy courses have become less focused on the most effective methods to learn and more concerned with satisfying industry's interest to gain exposure for their new equipment.

Strategy

Diversity, in and of itself, is important to advance our surgical specialty. However, we must collaborate and make a conscious effort to ensure that advancements are not impediments to surgical education. This complicated issue will require interest and participation by graduating colorectal trainees, program directors, and the American Board of Colorectal Surgery.

Post "80-Hour Week" Residency

The new culture of "entitled" residents is often disputed and discussed by staff surgeons at nearly every event or opportunity. During these discussions, faculty members often accurately recognize the dramatic difference between their generation of training and today's. However, they rarely suggest a solution and naturally do not understand the problem. Today's residents are burdened with more conferences, less efficient means to round, a surgical skills curriculum, reduced mentorship, and the expectations of the staff to provide exceptional patient care in less time than their predecessors. Numerous studies have shown that the 80-hour work-week has had a less than anticipated impact on patient care.[5–9] However, measuring the actual difference in patient ownership is more nebulous.

Strategy

The aforementioned culture of residency is permanent and we must therefore take the responsibility to make trainees understand the importance of making every case count. In his essay on leadership[10] John Maxwell recites, "The Law of the Big Picture" as "People do What People See." Therefore, it is unlikely for residents to prepare for cases well if they are not receiving instruction during the case or feedback after from disinterested faculty. Trainees must know and perceive that their trainers have a sincere interest in their education, or they will question their own motive of self-improvement.

Effective Teaching

Skills Laboratory/Curriculum

The appropriate methods to reduce existing barriers and to increase the volume of quality cases performed by general

surgery residents are often debated. However, surgical educators uniformly agree that nonclinical technical skills exercises, designed to optimize a residents experience with each operation, will play a critical role. The American College of Surgeons Review Committee for Surgical Education has made it mandatory that all surgical training programs have a means of training and assessment of operative performance outside the operating room.[11] Despite the existence of validated virtual reality simulators, they have not been evaluated comprehensively to substantiate their usage on a widespread scale. Inanimate skills laboratories are more affordable and curricula are becoming commonplace. They will unquestionably continue to impact surgical training[12] but discussion of their usefulness is beyond the scope of this chapter. Furthermore, in times of budget restrictions, the creation and maintenance of these elaborate laboratories may become less feasible. Kim et al demonstrated that training in the laboratory with either a nonsurgeon skills coach or a faculty surgeon resulted in no difference in performance of a basic surgical skill.[13] They concluded that nonphysician coaches may potentially reduce the teaching burden of faculty members who are already stretched thin.[13]

Preoperative Preparation

Optimizing the learning environment for every case involves a proactive approach by both the faculty and trainee. It has been demonstrated that preoperative rehearsal for a procedure, improves performance. Two recent randomized trials have demonstrated that a comprehensive ex vivo preoperative training curriculum improves a resident's ability to perform laparoscopic colectomy and cholecystectomy.[14,15] However, having all residents perform this labor-intense program before the procedure may not be practical. The cost and time requirements of the model studied in the aforementioned trial are also not sustainable in most training programs outside of a trial. In an effort to simplify this "rehearsal" and hasten the learning curve for laparoscopic right colectomy we designed an ongoing multicenter trial with an edited 15-minute "Voice Over" instructional video for residents to review before performing laparoscopic right colectomy. The results are unknown, but the early feedback has been encouraging.

Several, very basic but underutilized modalities should be considered to improve the educational quality of each case for the trainee. At the beginning of the rotation, attending surgeons should directly inform trainees of their expectations. Residents must fulfill their responsibility by coming to the operating room with a detailed knowledge of the relevant anatomy, the indications for surgery, steps of the procedure, and the potential complications. Staff surgeons may refuse and call this approach "spoon feeding," but it is more damaging and completely ineffective to assume that the resident understands unwritten expectations. Second, the trainer should become familiar with the skill level of the resident and be sure they understand the degree of complexity for each case. Third, it is important to verify that the trainees are being informed about case coverage in advance. If a resident is cross-covering or was not informed by either the faculty or administrative chief resident about the procedure, than the expectations and attitude must change. Lastly, it is critical to be an advocate for your trainee by helping them identify the appropriate resources that may help them prepare. As faculty, we often know how to access the best video or atlas that most accurately depicts the appropriate steps of the procedure.

Dunnington and coworkers call the preoperative discussion period "briefing." In their Briefing, Intraoperative teaching, Debriefing (BID) model, the briefing is a short interaction at the scrub sink.[16] The purpose of this interaction is to both assess the needs of the learner and to establish learning objectives for both the learner and teacher for that particular case. This conversation forces a review of past experiences and helps formulate needs and deficits. Furthermore, learners automatically integrate the experience making it more retrievable at a later date.[16] Unfortunately, it seems that this interaction seldom occurs. In a recent survey of nearly 5,000 residents, only 18% of the residents felt that the educational goals of the case or details of the procedure are discussed preoperatively.[17] Adoption of the simple yet effective communication strategy, outlined above, will have a dramatic impact on your current residents.

Operative Teaching

Several conventional and studied methods of training residents in the operating room have been described. Scaffolding is a teaching strategy that involves conscious or unconscious individualized support during surgery relative to a trainee's abilities.[18,19] This style was historically effective,[20] yet the reduction of case volume amongst trainees and lack of consistent faculty–trainee interaction have increased the need for alternative methods. The Halstedian apprenticeship model also relies significantly on experience acquired in the operating room with graduated responsibility for trainees as they progress.[21] The majority of surgical faculty members at academic institutions trained effectively with these methods, but they often fail to recognize that the new landscape of residency requires more to achieve the same result. The previously discussed BID model accurately describes the foundation of teaching during the case as a focused discussion on mutually shared learning goals.[16]

The same group of educators and surgeons,[22] more recently provided in an in-depth theoretical analysis at communication in the operating room in an effort to highlight "capturing the teachable moment." They thoughtfully categorize four types of interaction in the operating room (►**Table 1**).[16] *Instrumental* interactions have unfortunately become the most common form of interaction in the operating room. The goal of the faculty surgeon with these interactions is simply to perform the case as efficiently and safely as possible. All surgeons desire this outcome for their patients and therefore replacing *instrumental only* interactions with *instrumental/teaching* communication is truly an art. Teachable moments are more achievable when an appropriate understanding of mutual goals and familiarity is established before the procedure. However, it is essential to understand that opportunities also occur spontaneously during almost

Table 1 Concepts of intraoperative surgeon–resident interaction outlined by Roberts et al[22]

Intraoperative communication category	Description
Instrumental	Goal of interaction is to move the case forward. Termed instrumental because the surgeon often uses the learner like an instrument, as a means to an end.
Pure teaching	Intended primarily to benefit the learner through providing educational value.
Instrumental and teaching	Intended to achieve the pragmatic goal of moving the case forward while also conferring teaching.
Banter	Conversation unrelated to the procedure.

every case. Unexpected operative findings, an error by the resident recognized by the faculty, and improper technique all lend themselves to *teaching* or *teaching/instrumental interactions.* These moments will only be captured if the faculty surgeon is equipped and mentally primed to teach.

In addition to improving communication both preoperatively and during the case, surgical educators agree that deliberate practice is critical to master a technical skill. Residents are also familiar with this basic tenet, but they often require guidance and instruction in regards to understanding where they need to improve their skills. Ericsson explains deliberate practice as identifying an area of performance that is to be improved and then providing immediate detailed feedback during performance.[23] This approach is most useful to skills requiring manual dexterity that may or may not be relevant to the individual case. The immense variability with every procedure and dynamic environment of surgery can also inhibit this style of learning. However, educators have recognized its role and transitioned this methodology to skills laboratories.

Before addressing feedback and assessment, it is important to discuss the perception of guidance and/or supervision in the operating room. A national survey of 125 surgical residency programs addressed resident satisfaction with teaching and showed that 40% of residents sometimes felt "over-supervised" in the operating room and 21% always felt "over-supervised," both contributing to decreased satisfaction.[24] Optimally, the supervising faculty reduces the amount of guidance as the resident ascends through the program and demonstrates improved skills, safety, and confidence. The amount of supervision in the operating room is largely influenced by the complexity of the case, resident experience, attending skill, and desire to teach. This variability will always exist, but the group at Southern Illinois University (SIU) attempted to analyze and investigate operative supervision.[25] To accomplish their goal they used an operative performance rating system and blinded external experts to rate the amount of guidance for videotaped procedures. As expected, the researchers found variability amongst the supervising surgeons and witnessed a reduction in guidance with upper level residents. Furthermore, they discovered that the faculty surgeon typically underestimates the amount of supervision that they provide.[25] This finding requires further exploration and dramatically influences our ability to assess a resident's operative performance and their ability to ultimately perform the operation independently.

Putting It Together

Preoperative briefing, improved communication, graduated responsibility, deliberate practice, and measured thoughtful supervision all play a role in effective operative teaching. Their application can be facilitated and simplified by categorizing or better defining necessary surgical skills. This structure has been studied and validated repeatedly on the assessment side for both generic- and procedure-specific skills.[26–28] However, an organized categorical approach to intraoperative skills teaching is rarely discussed. We must start by asking, "What does it take to perform an operation well"? First, the surgeon must be very familiar with the anatomy and correct tissue planes. Next, the surgeon must have the manual dexterity to efficiently and safely perform the maneuvers required at each step of the procedure. Third, the surgeon must have sound "principles of dissection." This includes the appropriate use and knowledge of exposure, instruments, traction, energy, and the ability to use both hands efficiently. Fourth, the surgeon must know both the steps of the operation and all of the potential areas of complications.

These essential elements can be used as a framework to implement the training methods described above. Historically, the combination of a surgical atlas and exposure to an incredible volume of cases was adequate for a trainee to master the anatomy/planes of dissection. Achieving this same familiarity now requires preoperative preparation, exposure, and improved active communication throughout the case. Manual dexterity is the one skill that must now be mastered in both the operating room and skills laboratory. Establishing the appropriate principles of dissection, outlined above, is the element of surgical skill that requires the most instruction. To accomplish this in our current era of surgical training, the faculty and trainee must be fully engaged. The attending surgeon must consciously and continuously reduce *instrumental* interactions in exchange for *teaching* or *teaching/instrumental* communication. Mastery of the conduct or steps of the operation and recognizing potential pitfalls can only be truly realized with the Halstedian apprenticeship model, scaffolding, and appropriate but limited supervision.

Feedback/Assessment

Feedback through effective communication during the operation is addressed above. The significance of postoperative objective and subjective assessment has been well studied but unfortunately rarely occurs. A recent survey of program directors found that only 18% of programs had formal basic surgical skills evaluation with or without an objective method of assessment for operative procedures.[29] The SIU group describes postprocedure feedback as the "debriefing" in their BID model.[16] This step of their process took less than 5 minutes and involved the following: reflection, rules, reinforcement, and correction. This form of feedback is simple, efficient, and very effective.

After Objective Structured Assessment of Technical Skill was developed and validated,[26] numerous applications and variations of this tool were introduced for almost every subspecialty. We have now been inundated with validated scoring systems containing both the generic- and procedure-specific metrics. Unfortunately, the construct validation of these scoring systems has been inconsistent and arbitrary.

Furthermore, it has been demonstrated that substantial time often elapses between performance in the operating room and the completion of an evaluation tool.[30] Ideally, the faculty should complete a technical evaluation at the end of every case or at least within 24 hours. As faculty, we must become familiar with the validated specialty specific tools that are available for the assessment of trainees. We must further accept the responsibility for timely subjective and objective evaluations. Utilization of a validated assessment tool with your trainee will stimulate a postprocedure conversation and ultimately involve subjective feedback as well.

The General Assessment Scale (GAS), developed for laparoscopic colectomy, is a good example of this concept. This tool is a validated assessment scale that creatively incorporates the amount of verbal/nonverbal support needed for the trainee to complete the steps of the procedure.[31] It not only produces an objective score but also forces an open conversation about each step of the case between the faculty and trainee. The degree of nonverbal communication and guidance is underestimated during a laparoscopic procedure. The GAS model helps remind the trainee that supervision can be all perception. Several other validated tools exist for the assessment of laparoscopic colectomy, including [32] observational clinical human reliability analysis (OCHRA program). This software program can be used by surgeons or nonsurgeons to evaluate operative videos in colorectal surgery. This may be an attractive approach when surgeons are unable to devote significant time to assessment of their trainees' video performance.

To effectively incorporate meaningful assessment tools into residency, department chairs and program directors must mandate their usage and study their effectiveness. These surgical educators unquestionably recognize the need for objective assessment. However, the lack of consensus on a national scale and within each specialty is a major impediment. A comprehensive generic- and specialty-based national skills evaluation program will require considerable investment. However, without formative assessment, technical deficiencies will persist and the current culture of general surgical residency will inevitably fail at producing quality surgeons.[29]

Looking Ahead

Maintaining a standard of excellence for graduating surgical residents requires a comprehensive and consistent approach to surgical education. Faculty in academic institutions must continue to fight for the appropriate resources and incentives needed to train the next generation of surgeons. The impact of health care on education with the inevitable push to provide less expensive but equivalent and more efficient care must be carefully considered. Recent studies with simulation have shown promise for training as a preprocedure "warm up" and also for potential assessment. However, we must continue to ask, "At what cost?" If less expensive and effective methods exist they should be utilized. The importance of deliberate practice in skills laboratories has been well studied, but we must continue to organize and standardize our curriculum as the landscape changes.

We must also vastly improve our day-to-day communication with residents before, during, and after an operation. The careful and detail oriented evaluation we perform of each trainee should be consistent with that of our patients. Several validated metrics and tools of assessment exist but as surgical specialties and societies, we must collaborate and reach a consensus to improve their widespread utilization. Finally, the technological advancements essential for the advancement of surgical care must also be scrutinized more effectively. As leaders in the world of surgical education, we must ensure that our trainees are not overlooked in place of personal or professional gains.

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